

Diagnosis and Field Repair - SuperBrain and CompuStar Microcomputers

Introduction

Section I Features and Construction

Section II Module Swapout Procedures

Section II-A Processor Board Swapout

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Section III-D Video Alignment

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Screen	Audio	Visual	Developer Notes
Section: Introduction			
Intro	NARRATOR: The sequence of diagnostic tests illustrated in this course correspond to the programs contained on the Intertec Data Systems Diagnostic Diskette DA1. The test programs are explained in Intertec Technical Bulletin B051031 which accompanies the diskette. The testing procedures will be performed on the SuperBrain QD; however, all test procedures apply to the standard SuperBrain and the CompuStar Models 20 and 30 Video Processing Units.	SCREEN TITLE: INTRODUCTION Animated logo with sound effect appears then fades away Close up shot of SuperBrain appears Course title appears: Diagnostic Test Procedures For The Intertec Data Systems SuperBrain And CompuStar Microcomputers Close up of test diskette appears Close up shot of technical bulletin appears Shot of SuperBrain QD appears Shot of CompuStar Models 20 & 30 MAG VPU's appear	Open to animated logo with SFX DISSOLVE to CU SuperBrain SUPER TITLE: Diagnostic Test Procedures For The Intertec Data Systems SuperBrain And CompuStar Microcomputers DISSOLVE to CU test diskette DISSOLVE to CU technical bulletin DISSOLVE to MCU SuperBrain QD DISSOLVE to CompuStar Models 20 & 30 MAG VPU's

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Screen	Audio	Visual	Developer Notes
Intro	NARRATOR: This course is divided into three main sections. Section one is an introduction to the features and internal construction of the SuperBrain. Section two covers the procedures for module swapouts, since all diagnostic procedures involve swapping-out the four major modules around which the SuperBrain is designed. Section three is a sequence of diagnostic tests which aid in isolating system malfunctions. Each procedure is covered in a separate unit for selective study. When you successfully complete this course, you will be able to: • Identify the features of the SuperBrain and CompuStar computers and explain how they are constructed; • Swapout the four major modules around which the computer is designed; • Perform diagnostic test procedures to determine module failure; • Replace failed modules and return a malfunctioning unit to service.	SCREEN TITLE: INTRODUCTION Course table of contents appears Shot of SuperBrain with cover removed showing internal components appears Shot of a module swapout in progress appears Screen fades to black	DISSOLVE to CU course TOC DISSOLVE to MCU SuperBrain with cover removed showing internal components DISSOLVE to MS module swapout in progress FADE TO BLACK

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Screen	Audio	Visual	Developer Notes
Section I: Features and Construction			
I	NARRATOR: The standard features of the SuperBrain Video Computer include two double density disk drives, 64K of dynamic RAM, dual RS-232 communications ports for serial data transmission, operator convenience keys, a full numeric keypad complement and a typewriter compatible keyboard. Double sided disk drives are standard on the SuperBrain QD. The SuperBrain is designed around four basic modules for reliability and ease of servicing. The major components are the keyboard/CPU module, or processor board, the power supply module, the CRT assembly, including the video driver circuitry, and the disk drives. Failure of any component within the terminal can be corrected by simply replacing the defective module. Individual modules are attached to the chassis in a manner that facilitates easy removal and reinstallation.	SCREEN TITLE: FEATURES AND CONSTRUCTION Section title appears superimposed over a close up of SuperBrain QD Section I Features and Construction Titles fade away as narration begins Close ups of features appear as named: disk drives; ram chips; serial ports; keyboard showing alphanumeric, numeric and convenience keys Close up of SuperBrain QD nameplate appears Shot of four replacement modules arranged on work table appears Close ups of components appear when named: processor board; power supply module ; CRT assembly and video board; disk drives General shot of module swapout in progress appears Shot of module being pulled from mounting frame appears.	FADE UP to section title supered over head on shot of SuperBrain: Section I Features and Construction FADE Title Under CUT to features as called: disk drives; ram chips; serial ports; keyboard showing alphanumeric, numeric and convenience keys DISSOLVE to CU SuperBrain QD nameplate DISSOLVE to MS four replacement modules arranged on work table CUT to CUs of components as called: processor board; power supply module; CRT assembly and video board; disk drives DISSOLVE to shot of module swapout in progress DISSOLVE to shot of module being pulled from mounting frame

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Screen	Audio	Visual	Developer Notes
I	NARRATOR: Terminal down time is minimized by swapping out only defective modules and having component level repair performed at an Intertec Service Center. Spare modules may be purchased from an Intertec sales office, allowing any customer to maintain an in-house repair facility. Each of the SuperBrain's four major sub-assemblies are clearly defined in their respective functions for ease in servicing. All microprocessor circuitry is contained on the Keyboard/CPU or processor' board. The SuperBrain control section is based on the Z80A microprocessor, and the processor board contains twin Z80A microprocessors. The processor board also contains 64K of dynamic RAM, the character and keyboard encoder circuitry, the 'bootstrap' ROM, the disk controller and all communications electronics.	SCREEN TITLE: FEATURES AND CONSTRUCTION Shot of module being replaced in mounting frame appears Shot of modules on work table appears Close up of processor board appears Highlight of Z80A appears Highlight of RAM chips appears Shot of processor board from underneath appears	DISSOLVE to MS module being replaced in mounting frame DISSOLVE to MS modules on work table DISSOLVE to CU processor board HIGHLIGHT Z80A's HIGHLIGHT RAM chips DISSOLVE to CU processor board from underneath

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Screen	Audio	Visual	Developer Notes
I	NARRATOR: Power is supplied to and signals are sent from this module via a 22 pin ribbon cable connected to the main power supply module. Connection to the disk drive subassemblies is via a separate 34 pin ribbon cable. The processor board also contains a 40 pin connector for Z80 bus compatible devices. The CRT display module is a 12 inch, high resolution, cathode ray tube with an etched faceplate to reduce glare and provide uniform brightness. The CRT video driver circuitry is mounted in the base of the CRT chassis to facilitate removal and repair. Either the CRT or the video circuitry can be exchanged without disrupting any of the other major modules within the terminal.	SCREEN TITLE: FEATURES AND CONSTRUCTION Close up of 22 pin connection with cable visible at processor board connector appears Close up of 34 pin connection with cable visible appears Close up of 40 pin connectors appears Shot of CRT with display on screen appears Close up of video board showing location behind CRT assembly appears Shot of video board being removed from mounting plate appears	DISSOLVE to CU 22 pin connection with cable visible at processor board connector CUT to CU 34 pin connection with cable visible CUT to CU 40 pin connectors DISSOLVE to MCU head on shot of CRT with display on screen DISSOLVE to MCU video board showing location behind CRT assembly CUT to MCU video board being removed from mounting plate

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Screen	Audio	Visual	Developer Notes
I	NARRATOR: The main power supply module is a solid state, switching design that employs voltage regulators to provide trouble-free service. This design reduces heat dissipation and provides efficient cooling of the entire terminal with a low noise whisper fan. The power supply module includes the power on/off switch, user brightness control and the main and auxiliary RS-232 serial ports. Each SuperBrain contains two double density disk drive subassemblies which are double sided in the SuperBrain QD. The drives are located to the right of the CRT display module. Each is mounted on an aluminum mounting bracket which positions the drives flush with the front bezel of the unit. Power to the disk drives is supplied from the power supply module, located behind the drive assemblies. Data to and from the drives is routed via a single 34 pin ribbon cable connecting the drives to the Keyboard/CPU module.	SCREEN TITLE: FEATURES AND CONSTRUCTION Close up of power supply module appears Highlight of voltage regulators appears Close up of fan appears Close up of back panel appears with highlights of on-off switch, brightness control and serial ports as named Shot of front view of disk drives with cover on appears Cover disappears to show drives in mounting bracket Overhead shot of disk drives locating power supply appears Close up of disk drive from rear showing 34 pin cable appears Screen fades to black	DISSOLVE to CU power supply module HIGHLIGHT voltage regulators CUT to CU fan CUT to CU back panel - highlight on-off switch, brightness control and serial ports as called DISSOLVE to front view of disk drives with cover on DISSOLVE to matched shot with cover removed to show drives in mounting bracket DISSOLVE to overhead shot of disk drives showing power supply DISSOLVE to CU disk drive from rear showing 34 pin cable FADE TO BLACK

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Screen	Audio	Visual	Developer Notes
Section II: Module Swapout Procedures			
II	NARRATOR: Most mounting bolts in the SuperBrain are con-figured so they can be removed and replaced with either a quarter inch nut driver or a standard head screw driver. However, the disk drives are mounted with seven sixty-fourths inch Allen screws and the power supply module has one forward mounting bolt that requires a sideways ratchet for access. This bolt can be accessed with a long, standard flat head screw driver if a sideways ratchet is not available. These are the only tools required for the swapout procedure on any module. A replacement module of known good quality is required for each of the major component modules. The module with a suspected defect is removed and a module of known good quality is replaced to verify the suspected defect. This procedure is basic to the test procedure that follows in Section 3. Replacement modules are available from Intertec Sales Offices.	SCREEN TITLE: MODULE SWAPOUT PROCEDURES Section title appears over SuperBrain: Section II Module Swapout Procedures Shot of tools laid out on work table appears. Technician picks up tools as named: Nut driver Allen wrench Sideways ratchet Screw driver Technician returns screw driver and moves hand out of frame Shot of replacement modules laid out on work table appears Shot of module replacement in progress appears	FADE UP to section title supered over SuperBrain: Section II Module Swapout Procedures DISSOLVE to MS tools laid out on worktable with technician, screen right, picks up tools as called: Nut driver Allen wrench Sideways ratchet Screw driver Technician returns screw driver and moves hand out screen right DISSOLVE to MS replacement modules laid out on work table DISSOLVE to MS module replacement in progress

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Screen	Audio	Visual	Developer Notes
II	NARRATOR: Removing the cover of the SuperBrain is the first step in any swapout procedure. The cover is mounted with four five-sixteenth inch bolts, one in each corner of the machine, accessible from the bottom. With all four mounting bolts removed, the cover can be easily lifted off the chassis. Be careful to check that both disk drive doors are closed before attempting to remove the cover. Removing the cover with the disk drive doors open will break the doors. Also take special care not to catch a corner of the cover on any of the keys. It is possible to snag one or more keys if the cover is oriented to one side when it is lifted off the chassis and this can cause damage to the keypad if force is applied to remove the cover. With the cover removed, easy access is provided to any of the major modules in the SuperBrain.	SCREEN TITLE: MODULE SWAPOUT PROCEDURES Head on shot of SuperBrain, cover on, appears Technician lifts machine to show location of mounting bolts and removes one bolt Technician closes disk drive doors and lifts cover Close up of cover hanging on keypad, being re oriented, and lifted off appears Shot of cover being lifted free of the machine and set aside appears Screen fades to black	DISSOLVE to head on shot of SuperBrain with cover on DISSOLVE to MS technician lifting machine to show location of mounting bolts and removing one bolt Technician closes disk drive doors and lifts cover off the machine out of frame DISSOLVE to CU cover hanging on keypad, being re oriented, and lifted off machine and out of frame DISSOLVE to WS cover being lifted free of the machine and set aside on work table FADE TO BLACK

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Screen	Audio	Visual	Developer Notes
Section II-A: Processor Board Swapout			
II-A	NARRATOR: The processor board is held in place by six retaining screws, three above and three below the keyboard. These screws can be removed with either a quarter inch nut driver or a standard head screw driver. One of the six screws, the middle screw of the three above the keyboard, requires a nylon washer underneath to prevent a short circuit on the processor board. Take special care to replace the washer when replacing the processor board . If this screw is replaced without the nylon washer, a malfunction will occur. With the mounting screws removed, remove the 22 pin connector located at the rear of the processor board. Disconnect this cable with a gentle tug upward. It is not necessary to force this connector to remove it and undue force should not be applied.	SCREEN TITLE: PROCESSOR BOARD SWAPOUT Section title appears over SuperBrain: Section II-A Processor Board Swapout Shot of mounted processor board appears Retaining screws are highlighted Close up shot of processor board appears Screw requiring nylon washer is highlighted Medium shot of technician removing screws from processor board, including screw with nylon washer appears Technician removes 22 pin connector	FADE UP to section title supered over SuperBrain: Section II Processor Board Swapout DISSOLVE to MS mounted processor board HIGHLIGHT retaining screws DISSOLVE to CU processor board HIGHLIGHT screw with nylon washer DISSOLVE to MS technician removing screws from processor board, including screw with nylon washer Technician removes 22 pin connector

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Screen	Audio	Visual	Developer Notes
II-A	NARRATOR: Next, remove the 34 pin connector located on the right side of the processor board. This cable should also be removed with a gentle tug and should never be forced. Once all retaining screws and both cables have been removed, the processor board can be lifted out of its mounting space. Use caution not to damage any of the pin-out connectors on the bottom of the processor board. Have a piece of soft, corrugated cardboard ready when you remove the processor board and rest the board on it. If any of the pin-out connectors are bent, a short circuit will occur when the board is returned to operation. With the defective board removed from its mounting space, carefully insert the replacement board and set it gently into its proper position.	SCREEN TITLE: PROCESSOR BOARD SWAPOUT Technician removes 34 pin connector Technician removes processor board from mounting frame and turns bottom of board to camera Technician places processor board on corrugated cardboard and picks up replacement board Technician fits replacement board into mounting space and seats it gently	Technician removes 34 pin connector Technician removes processor board from mounting frame and turns bottom of board to camera DISSOLVE to MCU technician placing processor board on corrugated cardboard and picking up replacement board DISSOLVE to MCU technician fitting replacement board into mounting space and seating it

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Screen	Audio	Visual	Developer Notes
II-A	NARRATOR: Gently reconnect the 34 pin connector into its socket on the right side of the processor board. Be careful not to force this connector when replacing it. Next, gently reconnect the 22 pin connector in the socket of the rear of the processor board. Then, replace and tighten down the six retaining screws. The screws are firmly In place when they are "two fingers" tight, or as tight as possible using only the thumb and forefinger to apply torque. Be careful to replace the nylon washer on the middle screw above the keyboard. If this washer is not replaced, a malfunction will occur due to a short circuit on the processor board. This completes the swapout procedure for the processor board.	SCREEN TITLE: PROCESSOR BOARD SWAPOUT Technician replaces 34 pin connector Technician replaces 22 pin connector Technician tightens retaining screws and demonstrates two finger tight Technician replaces screw with nylon washer and tightens Screen fades to black	DISSOLVE to MS technician replacing 34 pin connector Technician replaces 22 pin connector Technician tightens retaining screws DISSOLVE to CU of technician demonstrating two finger tight DISSOLVE to MS of technician replacing screw with nylon washer and tightening FADE TO BLACK

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Screen	Audio	Visual	Developer Notes
Section II-B: Disk Drive Swapout			
II-B	NARRATOR: The disk drives are located to the immediate right of the CRT screen and are held in place with two seven sixty-fourths hex-head, or Allen, screws each. The screws are mounted on the bottom of the aluminum drive housing, one forward and the other to the rear of each disk drive. Remove both Allen screws on the drive to be replaced, then lift the drive unit slightly and move it forward in the mounting frame. Gently remove the power connector, a 4 pin connector located on top of the disk drive. Note that the power connectors are molded plugs. Two corners are rounded and the other two are square. The power connectors can only be reconnected in the proper orientation. This connector should never be forced. Take care to insure that the connector is properly oriented before attempting to reconnect it.	SCREEN TITLE: DISK DRIVE SWAPOUT Section title appears over SuperBrain: Section II-B Disk Drive Swapout Head on shot of disk drives appears Screw locations are highlighted Shot of technician with SuperBrain appears Technician removes mounting screw Technician lifts and moves disk drive forward Technician removes power connector Close up of power connector plug appears Rounded and square corners are highlighted	FADE UP to section title supered over SuperBrain: Section II Disk Drive Swapout DISSOLVE to MCU head on shot of disk drives HIGHLIGHT Screw locations DISSOLVE to MS technician with SuperBrain Technician removes mounting screw Technician lifts and moves disk drive forward Technician removes power connector CUT to CU power connector plug HIGHLIGHT rounded and square corners

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Screen	Audio	Visual	Developer Notes
II-B	NARRATOR: With the power connector removed, pull the drive forward and tilt it down to permit access to the rear of the drive unit. Then remove the 34 pin connector with a gentle tug. Do not apply undue force when removing or re-connecting. Note that the 34 pin drive cable is color coded for pin one with a dark blue stripe. When re-connecting this cable always orient the blue stripe down and make sure that the lead contacts pin one on the connector. With both cables disconnected, remove the disk drive from its mounting frame and substitute a disk drive of known good quality. Rest the replacement drive on the outer edge of the mounting frame and orient the 34 pin cable properly for pin one. When the cable is properly aligned, re-connect the cable with a gentle push. Do not apply undue force when re-connecting this cable.	SCREEN TITLE: DISK DRIVE SWAPOUT Technician moves drive forward and tilts it down to show rear of unit Close up of technician removing 34 pin connector Technician turns 34 pin cable to camera showing code stripe Technician lifts drive out of mounting frame and off screen, returns onscreen with replacement drive Technician rests drive on mounting frame and orients cable to pin one Technician connects cable	DISSOLVE to MS Technician moving drive forward and tilting to show rear of unit DISSOLVE to CU technician removing 34 pin connector Technician turns 34 pin cable to camera showing code stripe - make sure stripe is clearly visible and properly oriented DISSOLVE to MS technician lifting drive out of mounting frame and moving off screen, returning onscreen with replacement drive Technician rests drive on mounting frame and orients cable to pin one Technician connects cable

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Screen	Audio	Visual	Developer Notes
II-B	NARRATOR: With the 34 lead cable re-connected, gently slide the replacement drive into its proper orientation in the mounting frame and reconnect the power cable. Take care to insure that the molded plug of the power connector is properly oriented. DO NOT FORCE THIS CONNECTOR. If you notice resistance, re-check for proper orientation and connect it with a gentle push. The plug should slide snugly into place without using undue force. With both cables re-connected, check to make certain that each drive is properly seated and replace the mounting screws. This completes the swapout procedure for the disk drive units.	SCREEN TITLE: DISK DRIVE SWAPOUT Technician seats disk drive in mounting frame Technician re-connects power cable Close up of molded plug appears Technician checks seating and begins tightening forward screw Screen fades to black	Technician seats disk drive in mounting frame Technician re-connects power cable CUT to CU molded plug DISSOLVE to MS technician - checks seating and begins tightening forward screw FADE TO BLACK

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Screen	Audio	Visual	Developer Notes
Section II-C: Power Supply Swapout			
II-C	NARRATOR: The power supply module is located directly behind the disk drives. It is held in place by three short mounting screws that accept either a quarter inch nut driver or a standard flat-head screw driver. Two of the mounting screws are located on the backplate of the SuperBrain. The third screw is located on the very front of the power supply, at the rear of the processor board. The forward screw is more difficult to access and requires a sideways ratchet or a long standard head screwdriver. All three screws must be removed before the power supply module can be replaced. Once the mounting screws have been removed, remove both the green and black ground wires from the right side of the frame housing by loosening the mounting bolt. The green wire is from the AC supply and the black wire is from the power supply board.	SCREEN TITLE: POWER SUPPLY SWAPOUT Section title appears over SuperBrain: Section II-C Power Supply Swapout Shot of power supply module mounted on machine appears Close up of back panel appears Mounting screws are highlighted Close up of forward mounting screw appears Shot of technician removing forward screw appears Shot of power supply appears - camera zooms to close up of ground wire bolt on mounting plate Technician loosens bolt and removes green and black wires	FADE UP to section title supered over SuperBrain: Section II Power Supply Swapout DISSOLVE to med shot of power supply module locating it on machine DISSOLVE to CU back panel HIGHLIGHT mounting screws CUT to close up of forward mounting screw Technician removes forward screw DISSOLVE to MS power supply module ZOOM IN to locate ground wire bolt on mounting plate Technician loosens bolt and removes remove green and black wires

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Screen	Audio	Visual	Developer Notes
II-C	NARRATOR: Next, remove the power cable to the disk drives from the drives as illustrated in section 11-B. All leads terminate at the terminal lug line on the left side of the power supply module. All cables are replaced with the module and should be removed with the power supply when it is removed from the mounting plate. With all cables disconnected from other components, lift the power supply out of its mounting frame and replace it with a power supply of known good quality. Insert the replacement power supply into the space from which the defective board was removed and check to insure that it is properly seated. Re-connect the power cable to the disk drives, taking care that the molded plugs are properly oriented. Next, re-connect both the green and black ground cables to the mounting frame. and to the replacement power supply.	SCREEN TITLE: POWER SUPPLY SWAPOUT Shot of technician removing power connector from disk drives appears Shot of the power supply appears Camera zooms to close up of terminal lug line Shot of technician lifting power supply being lifted from mounting frame - technician clears wires as he lifts Technician inserts replacement power supply in mounting frame and seats it Technician connects power cable to disk drive Technician re-connects ground cables with mounting bolt and checks connection to lug line	DISSOLVE to MS technician removing power connector from disk drives DISSOLVE to MS power supply ZOOM IN to CU terminal lug line DISSOLVE to MS technician lifting out power supply, clearing wires and moving power supply out of frame Technician returns replacement into frame, inserts and seats Technician connects power cable to disk drive Technician re-connects ground cables with mounting bolt and checks connection to lug line

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Screen	Audio	Visual	Developer Notes
II-C	NARRATOR: Then re-connect both ground cables to the mounting frame. With all cables re-connected, replace the three mounting screws that hold the power supply in place. This completes the swapout procedure for the power supply module.	SCREEN TITLE: POWER SUPPLY SWAPOUT Technician re-connects ground cable Technician replaces and tightens mounting screws Screen fades to black	Technician re-connects ground cable Technician replaces and tightens mounting screws FADE TO BLACK

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Screen	Audio	Visual	Developer Notes
Section II-D: Video Board/CRT Assembly Swapout			
II-D	NARRATOR: The video board is located below the CRT on the chassis and contains all video driver circuitry. In this configuration, either the CRT itself or the video circuitry can be easily exchanged without disturbing any other major module. To remove the video board, first remove the 10 pin connector located at the rear of the board. Tug the connector gently without forcing it. The board itself is held in place by four plastic standoffs at the corners of the board. These standoffs must be pushed together with a pair of small needle nose pliers or a screwdriver and pushed through the mounting slot on the board.	SCREEN TITLE: Video Board/CRT Assembly Swapout Section title appears over SuperBrain: Section II-D Video Board/CRT Assembly Swapout DISSOLVE to shot from rear and slightly above to locate video board and CRT on machine CRT and video board are highlighted Close up SHOT of video board appears Technician removes 10 pin connector Standoffs are highlighted Technician releases one standoff	FADE UP to section title supered over SuperBrain: Section II-D Video Board/CRT Assembly Swapout DISSOLVE to shot from rear and slightly above to locate video board and CRT on machine HIGHLIGHT CRT and video board DISSOLVE to CU video board Technician removes 10 pin connector HIGHLIGHT standoffs Technician releases one standoff

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Screen	Audio	Visual	Developer Notes
II-D	NARRATOR: Once the standoffs are removed, remove the flyback transformer. It is held in place by two small bolts on the mounting frame and is replaced with the new assembly. When the flyback transformer has been removed, disconnect the groundstrap connector from the video board and loosen the mounting screw that holds it on the mounting frame. Next, remove the groundstrap connector from the CRT yoke. When the groundstrap connector is removed from the yoke, remove the round CRT connector from the back of the tube. The video board can now be replaced individually without removing the CRT. If the CRT is to be removed as well, first remove the four mounting bolts from the corners of the CRT. The CRT can now be lifted out of the mounting frame. If the CRT was removed, replace it with a tube of known good quality and fit it properly in the mounting frame. Replace the four mounting bolts.	SCREEN TITLE: Video Board/CRT Assembly Swapout Close up of flyback transformer appears Technician removes one nut Technician disconnects groundstrap connector from video board Technician loosens mounting screw Close up of CRT from rear appears Technician removes groundstrap and CRT connectors from yoke Medium shot of technician removing video board from mounting frame and sets it off screen Technician removes CRT mounting bolts Technician lifts CRT from frame and moves off screen Technician mounts replacement tube and tightens bolt	DISSOLVE to MCU flyback transformer Technician removes one nut Technician disconnects groundstrap connector from video board Technician loosens mounting screw DISSOLVE to close up of CRT from rear Technician removes groundstrap and CRT connectors from yoke DISSOLVE to MS technician removing video board from mounting frame and setting it off screen Technician removes CRT mounting bolt Technician lifts CRT from frame and moves off screen Technician mounts replacement tube and tightens bolt

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Screen	Audio	Visual	Developer Notes
II-D	NARRATOR: Also replace the video board with a board of known good quality. Take care to insure that the board is replaced in the proper orientation and snap it into place on the four plastic standoffs. With the board securely in place, re-connect the ground wire to the video board and remount it on the mounting frame. Re-connect the flyback transformer and tighten down both mounting bolts. Then replace the groundstrap connector on the CRT yoke and re-attach the round CRT connector on the back of the tube. When these interconnects are made, re-connect the 10 pin connector at the rear of the video board with a GENTLE PUSH, taking care not to force the connector. This completes the swapout procedure for the video board CRT assembly.	SCREEN TITLE: Video Board/CRT Assembly Swapout Shot of video board being seated in mounting frame appears Technician snaps standoff into position Technician replaces ground wire on board Close up of ground wire being tightened on mounting frame appears Shot of technician re-connecting flyback transformer and tightening bolts Close up of groundstrap connector being replaced on CRT yoke appears CRT connector on rear of tube is replaced 10 pin connector is re-connected Screen fades to black	DISSOLVE to MCU technician seating video board in mounting frame Technician snaps standoff into position Technician replaces ground wire on board CUT to CU ground wire being tightened on mounting frame DISSOLVE to MCU technician re-connecting flyback transformer and tightening bolts DISSOLVE to CU groundstrap connector being replaced on CRT yoke CRT connector on rear of tube is replaced 10 pin connector is re-connected FADE TO BLACK

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Screen	Audio	Visual	Developer Notes
Section III Diagnostic Test Procedures			
III	NARRATOR: The Intertec Diagnostic Diskette DA1 is designed to aid in diagnosing service problems with the SuperBrain and CompuStar microcomputer systems. Intertec Technical Bulletin B051031, which accompanies the test diskette, explains the programs contained on the disk and includes a flowchart of the test procedure. This course details the servicing procedures for SuperBrain and CompuStar microcomputers. It should be used with the explanations and flowcharts included in the technical bulletin. When used together, these materials provide a complete instructional package that will teach you how to diagnose malfunctions quickly and repair them in-house.	SCREEN TITLE: DIAGNOSTIC TEST PROCEDURES Section title appears over SuperBrain: Section III Diagnostic Test Procedures Close up shot of test diskette appears Close up of Technical Bulletin B051031 appears Close up of first page of flow chart appears Shot of SuperBrain and CompuStar computers appear Shot of viewer watching monitor with descriptions and flowcharts on desk appears General shot of test procedure in progress appears	FADE UP to section title supered over SuperBrain: Section III Diagnostic Test Procedures DISSOLVE to CU test diskette DISSOLVE to CU Technical Bulletin B051031 DISSOLVE to first page of flow chart DISSOLVE to MS SuperBrain and CompuStar computers DISSOLVE to viewer watching monitor with diskette and flowcharts on desk DISSOLVE to general shot of test procedure in progress

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Screen	Audio	Visual	Developer Notes
III	NARRATOR: The test diskette contains several programs that will test the Main Memory RAM, the Main and Auxiliary Serial Ports, Diskette Drives A and B, and Video Alignment. These programs do not test every component in the computer, but they provide quick diagnosis of module failures. All test procedures should be performed in the order shown on the flowchart to insure that the modules are tested in the proper sequence. This will eliminate unnecessary test time. After viewing a section in the course, read the descriptions and procedures thoroughly to make certain that you clearly understand each step in the test procedure. If you have unanswered questions, review the course again before you begin the test procedure on your SuperBrain.	SCREEN TITLE: DIAGNOSTIC TEST PROCEDURES Graphic showing table of contents appears Shot of technician with test in progress appears Technician consults flowchart Shot of technician reading technical bulletin appears Shot of technician viewing course appears Screen fades to black	DISSOLVE to graphic of diskette TOC DISSOLVE to shot of technician with test in progress Technician consults flowchart DISSOLVE to MCU technician reading technical bulletin DISSOLVE to MS technician viewing course FADE TO BLACK

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Screen	Audio	Visual	Developer Notes
Section III-A: Preliminary Diagnostics			
III-A	NARRATOR: Begin the diagnostic procedure by removing the cover from your SuperBrain. The four mounting bolts which secure the cover are accessible from underneath. This procedure is illustrated in detail in Section II of this course. FLOW CHART - STEP 1 With the cover removed, plug in the SuperBrain and turn the power switch on. The power switch is located on the right rear of the terminal as you face the computer. When facing the rear of the machine the switch is on the left. When the power switch is turned on, a soft whirring from the fan should be audible. Verify that the fan is running. If the fan is running, proceed to Step 2 of the flow chart.	SCREEN TITLE: PRELIMINARY DIAGNOSTICS Section title appears over SuperBrain: Section III-A Preliminary Diagnostics Shot of technician removing last mounting bolt and lifting cover appears Flow chart graphic Step 1" appears Technician plugs in power cord Close up of back panel appears - technician moves switch to on position Close up of fan running appears	FADE UP to section title supered over SuperBrain: Section III-A Preliminary Diagnostics DISSOLVE to MS technician removing last mounting bolt and removing cover from machine DISSOLVE to flow chart graphic Step 1 DISSOLVE to MS technician plugging in power cord CUT to CU back panel - technician moves switch to on position DISSOLVE to CU fan running

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Screen	Audio	Visual	Developer Notes
III-A	NARRATOR: If the fan is not running, this may indicate a fault on the power supply module. Turn the power switch off and replace the power supply module following the procedures illustrated in Section II-C of this course. When the power supply module has been replaced, turn the power switch on and verify that the fan is running. If the fan is now operating, proceed to Step 2 in the flow chart. If the fan is still not operating, this indicates that the problem did not occur from a fault on the power supply module. You can now be reasonably certain that the fault lies in the fan itself, so replace the fan with another of good quality. With the fan replaced, verify that it operates when the power is turned on. If the fan does not operate after replacing both the power supply module and the fan, contact the Product Services Department at Intertec Corporate Headquarters. One of these substitutions should cause the fan to come on when power is applied to the unit. When the fan comes on, proceed to Step 2 on the flow chart.	SCREEN TITLE: PRELIMINARY DIAGNOSTICS Shot of power supply module appears Technician turns backplate power switch to on position Close up of fan-running appears Shot of technician replacing fan appears Close up of fan running appears Shot power supply swap in progress appears	DISSOLVE to MS power supply module on machine Technician turns backplate power switch to on position CUT to CU fan-running DISSOLVE to MS technician replacing fan DISSOLVE to CU fan running DISSOLVE to LS power supply swap in progress

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Screen	Audio	Visual	Developer Notes
III-A	NARRATOR: FLOW CHART - STEP 2 Turn the contrast control, labeled as "user brightness control" fully clockwise. The brightness control is located to the right of the serial ports on the rear panel. With the contrast set, verify that the insert message comes up on the CRT. If the insert message is up, proceed to Step 3 on the flow chart .. If the insert message does not appear on the screen, check to see if there is a raster on the screen. The raster should be visible when the brightness control is turned fully clockwise. If the raster is displayed on the screen, but no insert message appears on the screen, substitute the CRT assembly, following the procedure illustrated in Section I I-D of this course. If the raster now appears with the insert message on screen, proceed to Step 3 on the flow chart. If the raster appears, but the insert message still does not appear on the screen, substitute the processor board, as illustrated in Section II-A of this course.	SCREEN TITLE: PRELIMINARY DIAGNOSTICS Graphic of Flow Chart Step 2 appears Shot of back panel appear Technician turns brightness control clockwise Shot of CRT with insert message and raster appears Shot of CRT with no raster or insert message appears Raster appears on screen Close up of video board/CRT assembly appears Shot of CRT with insert message and raster Shot of CRT with raster only appears Close up of processor board appears	DISSOLVE to flow chart graphic step 2 DISSOLVE to MS back panel Technician turns brightness control clockwise DISSOLVE to CU CRT with insert message and raster DISSOLVE to CRT with no raster or insert message Raster appears on screen DISSOLVE to CU video board/CRT assembly DISSOLVE to CU CRT with insert message and raster DISSOLVE to CU CRT with raster only DISSOLVE to CU processor board

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Screen	Audio	Visual	Developer Notes
III-A	NARRATOR: When the processor board has been replaced with a board of good quality, return to A on the flow chart and verify that the insert message is now on the screen. If the insert message now appears on screen, proceed to Step 3 on the flow chart. When beginning Step 2, if the insert message does not appear on screen, the raster may not appear either. If, at point A on the flow chart, no raster appears on the screen, substitute the power supply module, as illustrated in Section I I-C of this course. When the power supply has been replaced with a power supply of good quality, turn the power on and check for a raster on screen. If the raster now appears on screen, proceed to point B on the flow chart and check for the insert message on the screen. If the insert message appears, proceed to Step 3 on the flow chart.	SCREEN TITLE: PRELIMINARY DIAGNOSTICS Shot of CRT with insert message and raster on screen appears Shot of CRT screen dark with no raster, no insert message appears Graphic of Flow Chart with Point A highlighted appears Close up of power supply module appears Shot of CRT with raster and insert message appears Graphic of Flow Chart with Point B highlighted appears Step 3 on the Flow Chart is highlighted	DISSOLVE to CU CRT with insert message and raster on screen DISSOLVE to CU CRT screen dark with no raster, no insert message DISSOLVE to flow chart graphic with Point A highlighted DISSOLVE to CU power supply module DISSOLVE to CU CRT with raster and insert message DISSOLVE to flow chart graphic with Point B highlighted HIGHLIGHT Step 3 on the flow chart

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Screen	Audio	Visual	Developer Notes
III-A	NARRATOR: If the raster fails to appear after replacing the power supply module, substitute the CRT assembly. When the CRT assembly has been replaced with an assembly of good quality, again check for a raster on screen. If the raster is now on screen, proceed to point B on the flow chart and check for the insert message. If the insert message also appears on screen, proceed to Step 3 on the flow chart. If the raster fails to appear after both the power supply and the CRT assembly have been replaced, substitute the processor board with a board of known good quality. When this substitution is completed, return to point A and again check for the insert message. The insert message and the raster should appear after the proper substitution is made, following the order-indicated- in the flow chart. When the insert message appears, proceed to Step 3 on the flow chart. If none of the substitutions correct the problem and fail to bring up the insert message, contact the Product Services Department at Intertec Corporate Headquarters.	SCREEN TITLE: PRELIMINARY DIAGNOSTICS CRT dark with no raster, no message appears Close up of CRT assembly/video board appears CRT with raster appears insert message comes up Close up of CRT with dark screen appears Close up of processor board appears Graphic of point A on flow chart appears CRT with raster and insert message appears Graphic of Step 3 on flow chart appears	DISSOLVE to CRT dark with no raster, no message DISSOLVE to CU CRT assembly/video board DISSOLVE to CU CRT with raster - insert message comes up on screen DISSOLVE to CU CRT with dark screen CUT to CU processor board DISSOLVE to flow chart graphic HIGHLIGHT Point A DISSOLVE to CRT with raster and insert message DISSOLVE to flow chart graphic Step 3

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Screen	Audio	Visual	Developer Notes
III-A	NARRATOR: FLOW CHART - STEP 3 When the insert message appears on the screen, verify that the red light on disk drive A comes on. This light indicates that the drive is operating and ready to accept a diskette. If the light is on, proceed to Step 4 on the flow chart. If the light does not come on once the insert message appears on the screen, substitute the disk drive A subassembly following the procedure illustrated in Section II-B of this course. When disk drive A has been replaced with a drive subassembly of known good quality, verify that the red light now comes on. If the indicator light for drive A comes on, proceed to Step 4 on the flow chart. If the indicator light for drive A still does not come on, substitute the processor board, as illustrated in Section II-A. When the processor board has been substituted, check to see if the light now comes on after the insert message appears.	SCREEN TITLE: PRELIMINARY DIAGNOSTICS Graphic of Step 3 on flow chart continues Head on shot of computer with insert message on screen and disk drive A light on appears Head on shot of CRT with insert message but no light on drive A appears Close up of disk drive appears General shot of drive swapout procedure appears Head on shot with drive A light on appears Head on shot with drive A light off appears Close up of processor board appears Head on shot with drive a light on appears	DISSOLVE to MCU head on shot of computer with insert message on screen and disk drive A light on DISSOLVE to head on shot of CRT with insert message but no light on drive A DISSOLVE to CU disk drive DISSOLVE to MS drive swapout procedure in progress DISSOLVE to MCU head on shot with drive A light on DISSOLVE to head on shot with drive A light off CUT to CU processor board DISSOLVE to MCU head on shot with drive a light on

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Screen	Audio	Visual	Developer Notes
III-A	NARRATOR: If the light now comes on, proceed to Step 4 on the flow chart. If the light still does not appear, contact the Product Services Department at Intertec Corporate Headquarters. FLOW CHART - STEP 4 When the insert message has appeared on screen and the indicator light for disk drive A comes on, insert the test diskette into drive A. Take care to insert the diskette properly. The foil write protect tab should be on the top edge of the diskette and the name label should be facing the right side. The rounded rectangular cutouts on either side of the plastic cover are the points at which information is read from the diskette , and should be on the rear edge of the diskette.	SCREEN TITLE: PRELIMINARY DIAGNOSTICS Head on shot with drive A light off appears Graphic of flow chart step 4 appears Head on shot showing insert message on screen and Disk Drive A light on Close up of test diskette showing proper orientation for loading appears - features are highlighted as discussed	DISSOLVE to head on shot with drive A light off appears DISSOLVE to flow chart graphic Step 4 DISSOLVE to head on shot showing insert message on screen and Disk Drive A light on CUT to CU test diskette showing proper orientation for loading - HIGHLIGHT features as called: • Write protect tab • Name label • Cutouts

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Screen	Audio	Visual	Developer Notes
III-A	NARRATOR: Insert the diskette gently into disk drive A and seat it firmly in the drive. When the diskette is seated, close the disk drive door. The Disk Operating System, or DOS, load message should now appear on the screen. This DOS message indicates that the disk operating system has loaded and the computer is awaiting instructions. If the DOS message appears, proceed to Step 5 on the flow chart. If the message does not appear when the test disk is inserted into drive A, verify that the correct diskette has been inserted. If an incorrect disk has been inserted, replace it with the correct diskette, Intertec Diagnostic Diskette DA1, and insert the correct diskette in drive A. When the correct diskette has been inserted into drive A, check to see if the DOS message now appears on screen. If the DOS appears, proceed to Step 5 on the flow chart.	SCREEN TITLE: PRELIMINARY DIAGNOSTICS Shot of technician properly inserting diskette and closing drive door appears Shot of CRT with insert message appears - load message appears on CRT screen CRT with no load message appears Close up of incorrect name tab appears Close up of disk with correct name tab appears Shot of correct disk being inserted appears Shot of CRT with insert message appears - load message appears on screen	DISSOLVE to MS technician properly inserting diskette and closing drive door DISSOLVE to CU CRT with insert message message - load message appears on screen DISSOLVE to CU CRT with no load message CUT to incorrect name tab DISSOLVE to CU disk with correct name tab DISSOLVE to MCU correct disk being inserted DISSOLVE to CU CRT with insert message - load message appears on screen

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Screen	Audio	Visual	Developer Notes
III-A	NARRATOR: If the DOS still does not appear, this indicates that the problem may be on the processor board. Remove the test diskette, shut off the power and substitute the processor board following the procedure in Section I I-A. Always remember to remove the diskette before shutting off power to the SuperBrain. If you leave the diskette in the drive unit when shutting off power, you will damage the diskette and will not be able to use it for further testing. When the processor board has been substituted, again insert the test diskette and check for the load message to appear on screen. If the DOS loads, proceed to Step 5 on the flow chart. If the DOS still does not load, the problem is now likely to be in the disk drive A subassembly. Substitute the disk drive A subassembly following the procedure in Section II-B.	SCREEN TITLE: PRELIMINARY DIAGNOSTICS CRT with no load message appears Close up of processor board appears Close up of diskette being removed from drive A appears Shot of backplate - technician turns power switch to off position Shot of disk being inserted into drive A appears - load message comes up on screen Shot of CRT with no load message appears Close up of disk drive appears	DISSOLVE to CU CRT with no load message CUT to CU processor board DISSOLVE to CU diskette being removed from drive A appears CUT to MCU backplate - technician turns power switch to off position DISSOLVE to MCU disk being inserted into drive A appears - load message comes up on screen DISSOLVE to CU CRT with no load message CUT to CU disk drive

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Screen	Audio	Visual	Developer Notes
III-A	NARRATOR: When the disk drive has been replaced, re-insert the test diskette into drive A, taking care that it is oriented correctly. If the DOS message now appears on screen, you are ready to proceed with test procedures for specific functions in the SuperBrain. If the DOS message does not appear on the screen after making all substitutions in Step 4, contact the Product Services Department at Intertec Corporate Headquarters. With the DOS message on screen, type "DIR" and enter the command by depressing the Return key. The SuperBrain will display the directory to the test diskette which contains the commands necessary to access any of the test programs on the disk. This completes the preliminary diagnostics and set up procedure. The SuperBrain is now ready to run test programs from the diskette. Proceed to Step 5 on the flow chart.	SCREEN TITLE: PRELIMINARY DIAGNOSTICS Shot of disk being inserted into drive A appears Load message comes up on screen Shot of CRT with no load message appears Split screen appears with "DIR" being typed on keyboard below and, "DIR" appearing on screen above Disk directory appears on screen Close up of screen with directory display appears Screen fades to black	DISSOLVE to MCU disk being inserted into drive A Load message comes up on screen DISSOLVE to CU CRT with no load message DISSOLVE to horizontal split screen with "DIR" and "Return" being typed on keyboard below and, "DIR" and disk directory display on screen above DISSOLVE to CU screen with directory display FADE TO BLACK

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Screen	Audio	Visual	Developer Notes
Section III-B: RAM Test			
III-B	NARRATOR: The RAM test is Step 5 on the flow chart, and its purpose is to verify that the random access memory is fully operational. The test reads and writes binary patterns throughout the memory banks to verify the read/write operation. In the event of a failure, the SuperBrain will sound an alarm and indicate which RAM is defective in hexadecimal reference. This failure address must then be converted to binary to determine the failure location. The defective RAM bank must then be repaired by an Intertec-trained service technician. Only the processor board is replaced during field repair. To initiate the RAM Test, type "RAMTEST" and enter the command by depressing the Return key. When this command is entered, the machine will display a flashing pattern and will appear to be running. However, the SuperBrain is now paused to await further instructions.	SCREEN TITLE: RAM TEST Section title appears over SuperBrain: Section III-B RAM Test Block diagram highlighting RAM/CPU area to show testing location appears CRT display with RAM test in progress appears Alarm sounds and display of hexadecimal error map appears Close up shot of processor board appears Split screen appears with "RAMTEST" being typed on keyboard below and, "RAMTEST" appearing on screen above Technician presses return key CRT displays flashing pattern	FADE UP to section title supered over SuperBrain: Section III-B RAM Test DISSOLVE to block diagram graphic with of RAM/CPU area highlighted to show testing location DISSOLVE to CRT display with RAM test in progress PLAY alarm tone DISSOLVE to CU CRT with hexadecimal error map displayed DISSOLVE to CU processor board DISSOLVE to horizontal split screen with "RAMTEST" being typed on keyboard below and, "RAMTEST" appearing on screen above Technician presses return key CRT displays flashing pattern

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Screen	Audio	Visual	Developer Notes
III-B	NARRATOR: To continue the RAM Test, the SuperBrain will now ask which size memory to test, 32 K or 64 K RAM. To determine the RAM capability of your SuperBrain, inspect the RAM banks, located at the upper left of the processor board. If the top two rows of RAM sockets are filled with chips, your SuperBrain is equipped with 64 K RAM capability. The SuperBrain QD comes equipped with 64 K of dynamic RAM in the standard model; Other versions of the SuperBrain have the necessary sockets to expand RAM capability from 32K to 64K dynamic RAM. If there are two rows of RAM chips near the keyboard and two rows of empty sockets above them, your SuperBrain is equipped with 32K RAM capability. To test a SuperBrain with 64 K memory, type "6" and enter the command with return. For a 32 K RAM test, type "3" and return. The SuperBrain will then display three lines of information and is awaiting instructions for the tests you want to run. To test the disk buffer only, type "1". To test the RAM banks only, enter "2". To run both tests, enter "3". You do not have to press the Return key to enter the test number.	SCREEN TITLE: RAM TEST Shot of CRT with RAM size question appears Close up on RAM chips on 64K processor board appears Close up of RAM chips for 32k ram appears Split screen appears with "6" and Return being typed on keyboard below and, entries appearing on screen above Shot of CRT with test list appears	DISSOLVE to CU CRT with RAM size question displayed DISSOLVE to CU RAM chips on 64K processor board DISSOLVE to CU RAM chips for 32k ram DISSOLVE to horizontal split screen with "6" and Return being typed on keyboard below and, "RAMTEST" appearing on screen above DISSOLVE to CU CRT with test list displayed

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Screen	Audio	Visual	Developer Notes
III-B	NARRATOR: The screen will then show what appears to be an erratic display as it runs the RAM test program. However, a cycle counter appears in the upper right hand corner with the initial RAMTEST entry command and remains at zero until all instructions are entered. When the RAM test begins, the counter will indicate the current cycle as it runs . The number to the left of the cycling digit is the last completed cycle. When the RAM test has begun, the screen displays a three line message in the left hand portion of the screen indicating which test is being performed, the disk buffer test or the RAM bank test. When completed, the results will appear as "OK" or, if a failure has occurred, a hexadecimal error address will appear giving the location of the failure.	SCREEN TITLE: RAM TEST Split screen appears with "3" being typed on keyboard below and RAM test display appearing on screen above Close up of cycle counter superimposed over its location on CRT appears in rectangular highlight CRT displays successful disk buffer test result CRT displays failure result	DISSOLVE to horizontal split screen with "3" being typed on keyboard below and RAM test display appearing on screen above SUPER CU cycle counter in rectangular highlight over location on CRT DROP HIGHLIGHT DISSOLVE to CU CRT with successful disk buffer test result DISSOLVE to CRT with failure result

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Screen	Audio	Visual	Developer Notes
III-B	NARRATOR: When a fault occurs during the RAM test a continuous, high pitch, alarm tone will sound to alert the operator. The cycle indicator locks up immediately and displays the cycle in which the fault occurred. The error message, in hexadecimal, will appear in the upper left-hand portion of the screen. The first set of hex numbers indicates the address tested. The second set indicates the data that was written to that address, and the third set indicates the data that was read at that address. When a fault occurs during the RAM test, swap the processor board following the procedure illustrated in Section I I-A of this course. With a processor board of known good quality substituted, run the RAM test again. Let the test complete at least as many cycles as the first test to assure that the fault was indeed in the RAM banks. If faults occur repeatedly even with a processor board of verified good quality, contact the Product Services Department at Intertec Corporate Headquarters.	SCREEN TITLE: RAM TEST Failure tone plays Close up of locked cycle counter superimposed in a rectangular highlight appears Camera zooms in to close up of hexadecimal error message Close up of processor board appears Split screen appears with "3" being typed on keyboard below and RAM test display appearing on screen above General shot of processor board swapout in progress appears	PLAY failure tone SUPER CU locked cycle counter in rectangular highlight DROP SUPER ZOOM IN to CU hexadecimal error message DISSOLVE to CU processor board DISSOLVE to horizontal split screen with "3" and Return being typed on keyboard below and RAM test display appearing on screen above DISSOLVE to general shot of processor board swapout in progress

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Screen	Audio	Visual	Developer Notes
III-B	NARRATOR: Once the RAM test is initiated, the machine will cycle continuously until all RAM banks are tested. With the large RAM capability of the SuperBrain, this entire process would take several hours, so you will want to stop the RAM test when a desired number of cycles have been completed. To stop the RAM test, simultaneously depress the red keys on either side of the alphanumeric keypad to perform a system reset. However, do not stop the RAM test for at least one full cycle as indicated by the cycle counter. When the RAM test runs successfully, proceed to Step 6 on the flow chart.	SCREEN TITLE: RAM TEST Close up of CRT with RAM test in progress appears Close up of keyboard appears - technician presses reset keys Close up of cycle counter with one cycle completed Close up of CRT with successful RAM test results appears Screen fades to black	DISSOLVE to CU CRT with RAM test in progress DISSOLVE to CU keyboard - technician presses reset keys DISSOLVE to CU cycle counter with one cycle completed DISSOLVE to CU CRT with successful RAM test results FADE TO BLACK

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Screen	Audio	Visual	Developer Notes
Section III-C: Port Test			
III-C	NARRATOR: The port test is item six on the flow chart. It is designed to test the send and receive functions of the Main and Auxiliary serial ports. The program performs a test of the ports by sending data from one port to the other. An error is indicated when the data sent does not match the data received. To perform the port test it is necessary to have a port test cable designed to accommodate the program. Port test cables are available from Intertec, or you can make your own port test cable by wiring two RS-232 cable connectors as indicated by this drawing which is included on page four of Technical Bulletin B051031. Be careful to wire the cable exactly as indicated in the drawing, and mark the appropriate connectors clearly AUX and MAIN.	SCREEN TITLE: PORT TEST Section title appears over SuperBrain: Section III-C Port Test Block diagram highlighting ports to show testing location appears Close up of serial ports appears Close up of port test cable appears Graphic: wiring diagram for loop cable appears Close up of marked connectors appears	FADE UP to section title supered over SuperBrain: Section III-C Port Test DISSOLVE to block diagram graphic with ports highlighted to show testing location DISSOLVE to CU serial ports DISSOLVE to CU port test cable DISSOLVE to graphic: wiring diagram for loop cable DISSOLVE to CU marked connectors

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Screen	Audio	Visual	Developer Notes
III-C	NARRATOR: To begin the port test, connect the port test interconnect cable to the AUX and MAIN ports with a gentle push. Never apply undue force when connecting or disconnecting the port test cable. With the cable in place, type "PORTTST" and enter with return. Note that the letter "E" in test is dropped in this command. When the command is entered, the SuperBrain will display this message, indicating the setting required on the five-position dip switch located on the upper right-hand corner of the processor board in front of the 22 pin connector. The switches are numbered one through five from top to bottom. If the rocker switch is depressed to the right, the switch is on. If depressed to the left side, the switch is off. You must reset the switches to run the first test in the port test sequence which tests data transmission in synchronous mode. Turn switches one, two and five to the on position. Turn switches three and four to the off position. When the switches are correctly positioned, begin the port test by pressing the return key. The test will begin immediately.	SCREEN TITLE: PORT TEST Close up of test cable being properly connected to serial ports appears Split screen appears with "PORTTST" being typed on keyboard below and appearing on screen above Close up of CRT with switching directions displayed appears Close up of dip switch appears Technician sets switches for first test Split screen appears with the Return key being typed on keyboard below and port test display appearing on screen above	DISSOLVE to CU test cable being properly connected to serial ports DISSOLVE to horizontal split screen with "PORTTST" and Return being typed on keyboard below appearing on screen above DISSOLVE to CU CRT with switching directions displayed CUT to CU dip switch Technician sets switches for first test DISSOLVE to horizontal split screen with Return key being typed on keyboard below and port test display appearing on screen above

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Screen	Audio	Visual	Developer Notes
III-C	NARRATOR: When the test begins, the screen display will show the test results as they are performed. The display will indicate the ring indicator status, abbreviated RI, the data set ready status, abbreviated DSR, and will indicate when the test from AUX to MAIN and MAIN to AUX are being performed. When the ports have been tested in synchronous mode, the screen display will indicate that the rocker switches must be reset before the test will continue. Set switches one, two and five in the off position to the left, and switches three and four to the on position, to the right. When the switches are correctly positioned, enter "return" and the test of data transmission in asynchronous mode will begin. The status of RI and DSR are not re-tested or displayed. The display will indicate when the MAIN to AUX and AUX to MAIN tests have been performed and the SuperBrain will stop at this point and await the command to continue the port test.	SCREEN TITLE: PORT TEST Close up of CRT with port test in progress appears CRT displays switch setting information for second test Close up of technician setting switches for second test appears Split screen appears with the Return key being pressed on keyboard below and port test display appearing on screen above Close up of CRT with port test information displayed	DISSOLVE to CU CRT with port test in progress CRT displays switch setting information for second test CUT to CU technician setting switches for second test DISSOLVE to horizontal split screen with Return key being pressed on keyboard below and port test display appearing on screen above DISSOLVE to CU CRT with port test information displayed

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Screen	Audio	Visual	Developer Notes
III-C	NARRATOR: If an error occurs during any of the test sequences performed to this point, the port test program will stop, the keyboard will lock and the SuperBrain will respond only to a system reset, accomplished by depressing the two red keys on either side of the alphanumeric keypad simultaneously, If your SuperBrain completes the port test program through the RI, the DSR and the synchronous and asynchronous modes without detecting an error, the screen will display "Port Test Complete" and pause for instructions to continue. To continue the port test, enter return and the port transmission test will begin. As the port transmission test is performed, the screen will display the results. If the test encounters no errors, the display will appear as two lines of dots across the screen followed by AUX TO MAIN DATA COMPLETE. The dots will repeat and display MAIN TO AUX DATA COMPLETE below when the second transmission is completed. The display will then indicate "TEST COMPLETED".	SCREEN TITLE: PORT TEST CRT displays error condition for port test Close up of keyboard showing reset keys being pressed appears Close up of CRT displaying successful port test completion appears Split screen appears with "Return" being typed on keyboard below and port test transmission display on screen above Close up of CRT with port transmission test in progress appears CRT displays successful port transmission test results	CRT displays error condition for port test DISSOLVE to CU keyboard - technician presses reset keys DISSOLVE to CU CRT displaying successful port test completion DISSOLVE to horizontal split screen with "Return" being typed on keyboard below and port test transmission display appearing on screen above DISSOLVE to CU CRT with port transmission test in progress CRT displays successful port transmission test results

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Screen	Audio	Visual	Developer Notes
III-C	NARRATOR: If errors occur during the port transmission test, the display will appear as two rows of capital "E's" across the screen rather than double rows of dots. If an error occurs during the port test, the program will stop and the keyboard will lock. When this occurs, perform a system reset, remove the diskette and substitute the processor board as illustrated in Section I I-A. With the processor board replaced with a board of known good quality, repeat the port test procedure. If the test is still unsuccessful, substitute the power supply module by following the procedure in Section II-C. With a power supply of known good quality in place, repeat the port test. If the test still is unsuccessful, contact the Product Services Department at Intertec Corporate Headquarters.	SCREEN TITLE: PORT TEST CRT displays error condition Close up of keyboard with reset keys being depressed appears Shot of technician removing diskette appears Close up of processor board appears Close up of power supply module appears	CRT displays error condition DISSOLVE to CU keyboard - technician depresses reset keys DISSOLVE to Shot of technician removing diskette DISSOLVE to CU processor board DISSOLVE to CU power supply module

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Screen	Audio	Visual	Developer Notes
III-C	NARRATOR: If a failure occurs during the RI test, a failure message will appear indicating the failure. If a fault occurs at this stage of the port test, check the connections of the interconnect cable. If the connections are good, check the interconnect cable for proper wiring. If the cable is properly connected and correctly wired, substitute the processor board and perform the port test again. If the RI still fails, then replace the power supply module and run the port test again. If the RI fails after the connections and wiring have been verified and the processor board and power supply module have been replaced with modules of known good quality, contact the Product Services Department at Intertec Corporate Headquarters. Completing the appropriate substitution should produce successful port test results. When the port test runs successfully, remove the port test cables and continue to Step 7 on the flow chart. There is no need to reset the dip switches. Since the SuperBrain data transmission is normally in asynchronous mode, the last switch setting returned the computer to factory specifications for normal operation.	SCREEN TITLE: PORT TEST Close up of CRT with RI failure display appears Shot of technician checking cable connection appears Shot of technician checking cable wiring appears Close up of processor board and power supply module appears Close up of CRT with RI failure displayed appears CRT displays successful port test results Close up of dip switch with final in final settings appears Screen fades to black	DISSOLVE to CU CRT with RI failure display DISSOLVE to MS technician checking cable connection DISSOLVE to CU technician checking cable wiring DISSOLVE to MCU processor board and power supply module DISSOLVE to CU CRT with RI failure displayed CRT displays successful port test results DISSOLVE to CU dip switch with final in final settings FADE TO BLACK

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Screen	Audio	Visual	Developer Notes
Section III-D: Disk Test			
III-D	NARRATOR: The disk test is item seven on the flow chart. Two formatted, blank diskettes are required to perform the disk test. If no formatted diskettes are available, format two unused diskettes following the instructions in Section Three, pages six, seven and eight, of the SuperBrain User's Manual. The disk test program is designed to test the ability of each disk drive to read and write track and sector information accurately. An error occurs when the disk drives are unable to write and verify any step of the test procedure. The program tests both disk drives, and can be used to test both single and double sided disk drives, and either double or quad density drives. The program will display a summary of the test results when the test is completed, with an error map for any errors found.	SCREEN TITLE: DISK TEST Section title appears over SuperBrain: Section III-D Disk Test Block diagram highlighting disk drives to show testing location appears Close up of diskette labeled "Formatted-Blank" appears Close up of Section 3 of SuperBrain user's manual appears Shot of technician conducting disk test appears Close up of CRT with successful test results displayed appears	FADE UP to section title supered over SuperBrain: Section III-D Disk Test DISSOLVE to block diagram graphic with disk drives highlighted to show testing location DISSOLVE to CU diskette labeled "Formatted-Blank" CUT to CU Section 3 of SuperBrain user's manual DISSOLVE to MS technician conducting disk test DISSOLVE to CU CRT with successful test results displayed

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Screen	Audio	Visual	Developer Notes
III-D	NARRATOR: Three error messages may be displayed during the disk test. If the message ***crc error*** is displayed, it indicates that a disk write error has occurred. The error map displayed at the end of the test provides details of all crc errors. The messages Bdos Err on A: (or B) or ***disk not ready*** may appear when the test is initiated. The first message indicates that there is an error in the disk operating system information. The message ***disk not ready*** indicates that an unformatted diskette has been inserted into disk drive A, B, or both drives. In the event that either of these messages are displayed, a new, unused diskette must be formatted to replace the defective disk before the disk test can continue. Since no media is perfectly flawless, module substitution should only be performed if ten or more crc errors occur during the disk test. Fewer than ten errors are most likely to be the result of minute flaws in the media and do not indicate a component problem. If you are certain that the media is of good quality and more than ten errors occur, proceed with the substitutions indicated.	SCREEN TITLE: DISK TEST CRT displays ***crc error*** CRT displays Bdos Err on A: and ***disk not ready*** Shot of technician replacing disk appears Close up of CRT with error map showing 10 or fewer errors displayed appears	DISSOLVE to CRT with ***crc error*** displayed DISSOLVE to CRT with Bdos Err on A: and ***disk not ready*** displayed DISSOLVE to MS technician replacing disk DISSOLVE to CU CRT with error map showing 10 or fewer errors displayed

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Screen	Audio	Visual	Developer Notes
III-D	NARRATOR: To initiate the disk test, begin with the test diskette loaded and type "DISKTEST" and press return. When "DISKTEST" is entered, the CRT display will request instructions to proceed with a single or double sided disk drive test. Type 'S' for single sided or 'D' for double sided, and Return . Once the proper test has been chosen the display will verify that the correct test has been entered. In this case, the DOUBLE SIDED DISK EXERCISER has been entered. The display will also include instructions to place a formatted diskette in drives A and B. Remove the test diskette from drive A and replace it with a formatted diskette. Place a formatted diskette into disk drive B also, checking for proper orientation before inserting both disks. When formatted diskettes are properly inserted into each drive, press Return to begin the test sequence.	SCREEN TITLE: DISK TEST Split screen appears with "DISKTEST" being typed on keyboard below and entry appears on screen above Close up of CRT with 'S' or 'D' request displayed appears CRT displays double sided test verification with disk load instruction Shot of technician checking disk orientation and loading diskettes in drives Technician presses Return key	DISSOLVE to horizontal split screen with "DISKTEST" being typed on keyboard below and disk test display appearing on screen above DISSOLVE to CU CRT with 'S' or 'D' request displayed DISSOLVE to CRT with double sided test verification and disk load instruction displayed DISSOLVE to MS technician checking disk orientation and loading diskettes in drives Technician presses Return key

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Screen	Audio	Visual	Developer Notes
III-D	NARRATOR: When the test sequence begins, the CRT display will identify each drive and each track as it is being tested. The message ***crc error*** may also appear below the test location, indicating that a disk write error has occurred. However, you should not stop the test if this happens. Let the disk test run to completion. The entire test takes from twenty to thirty minutes to complete, depending on whether single or double sided drives are being tested. Upon completion, a summary of the test results will be displayed with an error map for all crc errors. If the disk test is completed with ten or fewer errors, proceed to Step 8 on the flow chart. If the summary indicates that more than ten errors have occurred during the test, substitute the disk drive on which the errors have occurred, following the procedure illustrated in Section II-B of this course. When the suspect drive has been replaced with a disk drive of known good quality, run the disk test again.	SCREEN TITLE: DISK TEST Close up of CRT disk test in progress appears CRT displays crc error notification CRT displays error map for completed test CRT displays successful test results Close up of disk drive appears Shot of technician initiating disk test appears	DISSOLVE to CU CRT with disk test in progress DISSOLVE to CRT with crc error notification displayed DISSOLVE to CRT with error map for completed test displayed DISSOLVE to CRT with successful test results displayed CUT to CU disk drive DISSOLVE to MC technician initiating disk test

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Screen	Audio	Visual	Developer Notes
III-D	NARRATOR: If the test runs successfully after substituting the disk drive indicated by the test summary, proceed to Step 8 on the flow chart. If the test summary still indicates ten or more errors on either disk drive, substitute the processor board, following the procedure illustrated in Section II-A of this course, and run the disk test again. Making the proper substitution should produce successful disk test results. When the disk test runs successfully, proceed to Step 8 on the flow chart. If the disk drive still fails to run successfully after these substitutions have been performed, contact the Product Services Department at Intertec Corporate Headquarters.	SCREEN TITLE: DISK TEST Close up of CRT with error map with more than ten errors appears Close up of processor board appears Close up of CRT with successful disk test results appears CRT displays test results with more than ten errors Screen fades to black	DISSOLVE to CU CRT with error map with more than ten errors CUT to CU processor board CUT to CU CRT with successful disk test results displayed DISSOLVE to CRT with test results with more than ten errors displayed FADE TO BLACK

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Screen	Audio	Visual	Developer Notes
Section III-E: Video Alignment			
III-E	NARRATOR: The video alignment program fills the screen with the capital letter 'H' to allow the CRT display to be checked for geometry, linearity, centering and other aberrations in the display that result from improper adjustment. No error conditions are generated by the video alignment program, and only a non-ferrous alignment tool is required for some of the adjustments. To initiate the video alignment program, type SCREEN and return.. When the command is entered, the screen should fill with the capital letter 'H'. Visually inspect the picture for aberrations and perform the necessary adjustments on the appropriate components of the video board.	SCREEN TITLE: VIDEO ALIGNMENT Section title appears over SuperBrain: Section III-D Video Alignment Block diagram highlighting RAM/CPU area to show testing location appears Close up of CRT with video alignment screen displayed appears Close up of non-ferrous alignment tool appears Split screen appears with "SCREEN" being typed on keyboard below and video alignment display appears on screen above Close up of video board appears	FADE UP to section title supered over SuperBrain: Section III-D Video Alignment DISSOLVE to block diagram graphic with video board highlighted to show testing location Cut to CU CRT with video alignment screen displayed DISSOLVE to CU non-ferrous alignment tool DISSOLVE to horizontal split screen with "SCREEN" being typed on keyboard below and video alignment screen displayed above Cut to CU video board

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Screen	Audio	Visual	Developer Notes
III-E	NARRATOR: All display picture controls are easily accessible and appear in these locations on the video board: The vertical height control, R303 The vertical hold control The contrast control, RI01 The vertical linearity control, R307 The focus control, R477 The brightness control, RI09 The horizontal width control, L403, and The horizontal centering control, R410 These controls are used to adjust all aberrations in the screen display, except the overall picture position which is adjusted with the centering rings on the CRT yoke.	SCREEN TITLE: VIDEO ALIGNMENT Each control is highlighted when called by narrator Vertical height control Vertical hold control Contrast control Vertical linearity control Focus control Brightness control Horizontal width coil Horizontal centering control Centering rings on yoke	HIGHLIGHT vertical height control HIGHLIGHT vertical hold control HIGHLIGHT contrast control HIGHLIGHT vertical linearity control HIGHLIGHT focus control HIGHLIGHT brightness control HIGHLIGHT horizontal width coil HIGHLIGHT horizontal centering control HIGHLIGHT centering rings on CRT yoke

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Screen	Audio	Visual	Developer Notes
III-E	NARRATOR: The first step in the video alignment procedure is the raster adjustment. First, adjust the external brightness control, located on the backplate beside the RS232 serial ports, fully clockwise. Then adjust the brightness pot clockwise until a background raster appears on the screen. The brightness pot is located here, on the right rear of the video board. When the raster appears on the screen, adjust the external brightness control counter clockwise until the raster disappears. The next step in the alignment procedure is the contrast adjustment. The contrast control is located here, on the right rear of the video board, behind the vertical roll control. The contrast should be adjusted until the dot matrix of characters is as bright as possible without distorting. This example shows a picture with a distorted display. The picture should be adjusted until the distortion subsides as shown .	SCREEN TITLE: VIDEO ALIGNMENT Close up of CRT with alignment display appears Close up of backplate with brightness control highlighted with arrows indicating clockwise adjustment appears Close up of video board with brightness pot highlighted appears Close up of CRT with raster coming up appears Raster disappears Close up of video board with contrast control highlighted Close up of CRT with distorted characters appear Distortion corrects	DISSOLVE to CU CRT with alignment display Cut to CU backplate with HIGHLIGHT brightness control arrows indicating clockwise adjustment Cut to CU video board with brightness pot highlighted DISSOLVE to CU CRT - adjust raster up then down Cut to CU of video board with contrast control highlighted DISSOLVE to CU of CRT with distorted characters - correct distortion

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Screen	Audio	Visual	Developer Notes
III-E	NARRATOR: When the brightness, contrast and raster are properly adjusted, check the picture for top and bottom margins. The display should have roughly one half inch clearance on the top and bottom. If the picture is too high or low, adjust it with the vertical height pot, located on the right front of the video board until the proper margins are obtained. The next characteristic to check is vertical linearity. Each row of characters should be the same height. Check the top, middle and bottom rows of characters to verify that they are of the same height. If one or more of the rows differ in height, adjust the vertical linearity control, located on the front of the video board beside the picture height control, until the rows are of equal height. The character set should be clearly focused so the characters are easily visible at normal operating distance. The focus control is located under the harness wire behind the vertical linearity control. It should be adjusted until the image is sharp and clearly defined.	SCREEN TITLE: VIDEO ALIGNMENT Arrows indicating margins appear Close up of video board with vertical height pot highlighted appears Close up of CRT with video alignment screen displayed appears Arrows appear to indicate top, middle and bottom rows of characters Close up of video board with vertical linearity pot highlighted appears Close up of CRT with video alignment screen displayed appears Close up of video board with focus pot highlighted appears Close up of CRT out of focus appears Display comes into sharp focus	SUPER arrows over margins DISSOLVE to CU video board with vertical height pot highlighted DISSOLVE to CU CRT with video alignment display SUPER arrows on top, middle and bottom rows of characters Cut to CU video board with vertical linearity pot highlighted DISSOLVE to CU CRT with video alignment display Cut to CU video board with focus pot highlighted DISSOLVE to CU CRT with display out of focus - pull into sharp focus

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Screen	Audio	Visual	Developer Notes
III-E	NARRATOR: The picture should have a one half inch margin on each side of the display. If the picture is skewed to either side, adjust the horizontal width coil until the proper margins are set. The horizontal width coil is located here, on the left front of the video board, and requires a non-ferrous alignment tool for access. Insert the alignment tool in the guide and fit it into the slot. Then adjust the control until the proper margins are displayed. The overall picture position can be adjusted with the centering rings located here, on the CRT yoke. Fine adjustments of the left or right position of the picture can be made by adjusting the horizontal centering pot, which is located behind the horizontal width control, separated by a capacitor.	SCREEN TITLE: VIDEO ALIGNMENT Arrows appear to indicate margins Close up of video board with horizontal width coil highlighted appears Technician inserts alignment tool and makes adjustment Close up of CRT with improper margins correcting appears Close up of CRT yoke with centering coils highlighted appears Close up of CRT showing motion from yoke adjustment appears Close up of video board appears with horizontal centering pot highlighted	SUPER arrows over side margins DISSOLVE to CU video board with horizontal width coil highlighted Technician inserts alignment tool and makes adjustment DISSOLVE to CU CRT with improper margins - correctly adjust margins Close up of CRT yoke with centering coils highlighted appears DISSOLVE to CU CRT - show motion from yoke adjustment DISSOLVE to CU video board with horizontal centering pot highlighted

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Screen	Audio	Visual	Developer Notes
III-E	NARRATOR: When all adjustments are properly made, the picture should be good in all respects. The geometry should be correct, showing straight lines and square corners. The picture should be at the correct height and show no evidence of a squeezed image. The width should be full with a one half inch margin and should show no horizontal aberrations. The contrast should be at a comfortable level with no distortion and no raster showing. The brightness should be at a level that permits the display to be seen without difficulty at all points on the screen. The picture should be in sharp focus with all characters clearly defined at all points on the display. If the picture has flaws in any of these characteristics, correct the flaws by adjusting the proper control on the video board. The video alignment program is the last program in the SuperBrain test sequence. When video alignment is completed, perform a system reset, by depressing the two red keys on each side of the alphanumeric keyboard simultaneously. Remove the test diskette and replace the cover on the chassis and bolt it down.	SCREEN TITLE: VIDEO ALIGNMENT Close up of CRT with display properly adjusted appears Arrows point to lines and corners Arrows point to top and bottom margins Arrows point to side margins Arrow points to individual character Shot of SuperBrain appears, technician presses keys to initiate reset Technician removes diskette and replaces cover	DISSOLVE to CU CRT with display in properly adjusted SUPER arrows on lines and corners SUPER arrows on top and bottom margins SUPER arrows on side margins SUPER arrow on individual character DISSOLVE to MS technician with SuperBrain - presses keys to initiate reset Technician removes diskette and replaces cover

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Screen	Audio	Visual	Developer Notes
III-E	NARRATOR: With modules of good quality substituted for all defective modules found during the test sequence, the SuperBrain should now be ready to return to normal service. If the test sequence fails to correct any problem and you are certain that all replacement modules were of good quality, contact the Product Services Department at Intertec Corporate Headquarters. If you have any questions about the test procedures illustrated in this course, return to the section of the course that deals with the procedure you have difficulty with. The course is designed to provide a complete explanation of each procedure within the section dealing with a particular topic so you can review only those sections which you have questions about. However, all module swapout procedures should be mastered before beginning the test sequence, since all diagnosis and repair is based on module substitution. If you have further questions after you have thoroughly reviewed the section in question, ask your supervisor or the designated employee in your organization who has attended a SuperBrain training seminar at Intertec Corporate Headquarters.	SCREEN TITLE: VIDEO ALIGNMENT Technician inserts CP/M diskette Close up of CRT display ready for normal operation appears Shot of user viewing course appears Shot of module swapout in progress appears Screen fades to black	DISSOLVE to technician inserting CP/M diskette DISSOLVE to CU CRT with normal operating display DISSOLVE to MS user viewing course DISSOLVE to MS module swapout in progress FADE TO BLACK

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